

Plant Parts, Functions and Processes

Flower:

Flowers are made up of two main parts, the filament and the anther. Flowers form the production of seeds and fruits through a fertilization process. Flowers also appealingly attract insects, vital for pollination.

Stem:

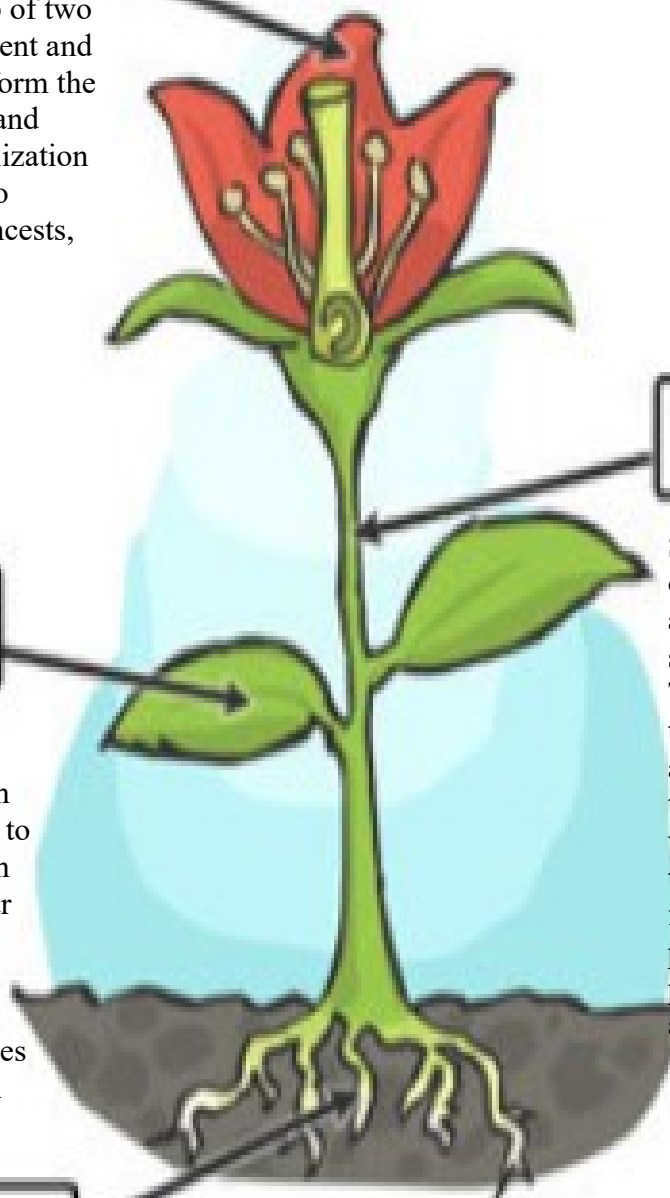
Stems connect the roots of plants to their leaves and are part of the shoot systems of the plant. The stem forms petioles that then form leaves and the main function of the stem is to carry water and nutrients from the roots to the leaves / flowers. The stem provides support for the plant and also has the ability to store food.

Leaf :

Leaves are several layers of cells and molecules that take in energy from sunlight to turn water and carbon dioxide gas into sugar and oxygen gas through a conversion process known as photosynthesis. Leaves provide food through veins, to the plant.

Roots:

Roots form from seed at germination that hold the plant firmly in ground, at the stem. The main function of roots is to absorb water and nutrients from the earth, essential to the survival of the plant. Roots have the ability also, to store food and bind important soil particles contributing to the dirt cycle but preventing soil erosion.



Plant nutrients and their Characteristics

Nitrogen: The characteristics of nitrogen is that it is colourless, odourless and tasteless. Soil gets nitrogen from the atmosphere, which in turn is vital for the chlorophyll molecule which enables photosynthesis, and is most present in protein molecules.

Phosphorus: Phosphorus is a non metallic chemical element from the nitrogen family, that is colourless, semitransparent and contains waxy solids that glow in the dark. Phosphorus aids in the metabolic process of photosynthesis through it's nucleic acids and sugar phosphates.

Potassium: Potassium is an elemental conductor vital to the transference of heat, nutrients and energy around the plant. The main role of potassium in plant growth is its transference of water and carbohydrates through plant tissue. Potassium increases root growth and promotes thicker cell walls through preserving the structure of enzymes, aswell as providing an ionic bond.

Calcium: Calcium is an important nutrient for roots. It is a tarnishing element that is salt soluble and responsible for strengthening the formation of cell walls and shoot tips.

Magnesium: Magnesium aids in photosynthesis. It is a vital component of chlorophyll as it is located within the enzymes of the chlorophyll molecule. It is the conductor of enzyme systems and is required for energy production and structure.

Sulphur: Sulfur is a non metallic chemical element from the oxygen group. Sulphur helps the protein structure and forms enzymes that promote cell and plant growth.

Carbon: Carbon molecules are compounds that make up plant tissue. It is stored in biomass and is recycled through soil and respiration. Carbon is the basis of all life forming mass.

Hydrogen and Oxygen: Water is an essential element for all plant growth as it allows the transference of water soluble micronutrients, vital to the health and well-being of the plant, to be transported through the vascular system.

References Used:

all elements- [7 Essential Elements of Macronutrients | Plants \(biologydiscussion.com\)](https://biologydiscussion.com/plant/7-essential-elements-of-macronutrients/)

Soil Modification

Activity 2

The Crop:

Tomato – *Solanum lycopersicum*

Growing the perfect tomatoes can be about lighting and climate as well as choosing the right kind of tomato... Then it comes down to soil.

Whether you use garden soil, sandy loam, clay loam or compost the top soil requirements of tomatoes are:

- a soil Ph of around 6.2 – 6.8
- good drainage, deep watering
- Nitrogen – for leaf growth
- Phosphorus – for healthy roots
- Potassium – for fruiting and flowering
- Organic matter, loose soil with air flow

For growing tomatoes from seed, this is best done indoors, or a warm climate of around 16 – 25 degrees. A common seed mix is made up of compost, perlite, vermiculite and coir. This is apt but it is mainly temperature and air flow that will get your seeds sprouting.

From around 3cm high, preparing your garden bed or hot house with plastic ground cover will help to retain soil temperature. Beaded slow release fertilizer or compost will assist with a nutrient rich soil in which a garden mulch will later help to retain soil temperature as well as inhibiting the spread of soil bound diseases to the lower leaves of the tomato plant. Stakes, air flow and consistent watering will help for strong plants and this can also be encouraged by trimming the lower leaves and raising the soil bed to cover the base of the tomato stem which will promote new roots and a stronger plant.

Watering with a plant food as well as trimming in excess or dying leaves will help to retain energy for fruiting, but all leaves are the photosynthesizing factor that creates the sugars for that sweet tomato taste.

References used for this Activity:

Tomato Ph - https://harvesttotable.com/tomato_growing_six_requirement/

Seedlings - [10 Tips for Growing Great Tomatoes \(thespruce.com\)](https://thespruce.com/10-Tips-for-Growing-Great-Tomatoes-1182784)

Soil Requirements - [skilledgardeners.com](https://skilledgardeners.com/soil-requirements-for-tomatoes/)

For transplant of tomatoes, my Fiance I have set up a container 37cm in diametre with kiwi garden potting mix that also consists of a compound called gypsum. This is said to be a super phosphate ferterlizer and can assist in the avoidance of blossom end rot.

Here is our container:





Vege Max, NPK with the promotion of leaf growth for sweeter tomatoes.



Weed Types

fyi, botanical names of weed species that represent an example of having the physical characteristics of the following weed types, such as:

Rhizomes -

- *Glechoma hederacea* - Creeping charlie
- *Celastrus orbicalatus* - Oriental bittersweet
- *Equisetum hyemale* - Horsetails
- *Polygonum cuspidatum* – Japanese knotweed

Tubers -

- *Bomarea multiflora* - Trailing lily
- *Ottelia ovalifolia* - Swamp lily
- *Anredera cordifolia* - Mignonette vine

Root Segments -

- *Chenopodiaceae* - Lambsquarters, gooseroot
- *Poaceae* - Wheat/Blackgrass

Bulbs -

- *Ornithogalum spp* - Chinchinchee
- *Oxalis pes-caprae* - Soursob
- *Muscari armeniacum* – Grape hyacinth

Seeds -

- *Cynodon dactylon* - Bermuda grass
- *Plantago major* - Broadleaf
- *Imperata cylindrica* – Cogongrass

Stolons -

- *Argentina anserina* – Silverweed
- *Hieracium* – Hawkweed
- *Ajuga* – Carpet bugle

Physical and Chemical Defenses -

- *Setaria italica* – Foxtail
- *Abutilon* – Velvetleaf
- *Kochia scoparia* - Kochia

References used:

Rhizome information - [Rhizomes: What They Are and Why They're So Problematic \(thespruce.com\)](https://thespruce.com/rhizomes-what-they-are-and-why-theyre-so-problematic-1182787)

Tuber examples - [Weed List • Weebusters](#)

Root segments - [Root discrimination of closely related crop and weed species using FT MIR-ATR spectroscopy - PubMed \(nih.gov\)](#)

Weed Guide - [Weed Identification Guide | Better Homes & Gardens \(bhg.com\)](#)

Garden Weeds - [fs59 Garden weeds - bulbs.indd \(nsw.gov.au\)](#)

seed weeds - [SS-AGR-08/WG006: Weed Management in Pastures and Rangeland—2020 \(ufl.edu\)](#)

Introduction to Outdoor Plant Processes

The Crop:

Citrus reticulata (mandarin)

1.

Light to medium fertile loamy soil with ample drainage with a pH between 6 and 8 is the perfect medium for successfully growing mandarins in southern New Zealand and with this potted soil you are sure to not have a weed problem. But as mandarin trees age, they do become adaptable to earth soil and with this comes the struggle for space and nutrients in high occupied areas with broad species.

Mandarins do not compete well with grass and weeds, but the use of mulch could also lead to root rot. Common weed problems associated with citrus plants are:

- *Conyza bonariensis*
- *Sorghum halapensis*
- *Paspallum dilatatum*
- *Ipomea purpurea*
- *Tribulus terrestris*
- *Xanthium strumarium*
- *Cirsium vulgare*

***Cirsium arvense*:**

The Thistle is a biennial plant that grows 1-4ft tall and about 5 inches wide with hairy prickly leaves and blooms purple flowers mid-summer to autumn and from seedling to reproduction, the plant's life-cycle takes about 6 weeks.

With deep verticle roots and wide spreading horizontal roots, severed roots can form new plants, so the use of herbicides is suggested. It is best to remove these weeds immediately.

***Ipomea purpurea*:**

As mandarin trees are often grown in parks and gardens these warm moist areas encourage the growth of the annual nightshade weed, Morning glory. After natural scarification and a germination period of 12-24hrs these fast growing vines will reach upto 1m wide - 3m tall in 1-2yrs if not extracted. These intrusions will shade and rob our mandarin tree of nutrients if physical and chemical weed management techniques aren't understood and employed. Herbicides like **Fluroxypyr 200 g/L (Starane™)** will disrupt the growth of plant cells therefore ridding it. Manual removal of the plant at any stage is also suggested.

Tribulus terrestris:

This sanskrit immunity boosting aphrodesiac herb called Gokshura is a spiky leaved bushy nuisance to mandarin trees by growing between 10cm to 1m wide and high and competing for nutrients. This taproot plant etches deep and in this case, chemical management is not very successful as this must be applied prior to germination to be effective. (wikipedia 2021) Biological and physical weed control techniques such as introducing an insect like the weevil for example whom will deposit its eggs into the flowering bud and the larvae will eat the seeds.. or introducing a more favourable, opportunistic plant in symbiosis with mandarin trees such as *Pisum sativum* which produces high potassium which mandarins need.

2.

Pests either in the soil or on the plant of citrus trees can be detrimental to its health. Among the most common pests are caterpillars, aphids, white fly, thrip and citrus leaf miner. The use of insecticides is recommended if the problem is severe but citrus trees are also known for their resilience to feeding damage. Below, details tree randomly selected insect pests:

Toxoptera aurantii:

Aphids are commonly recognised by their small size and distinctive green, although colors and flightness may vary across the aphidoidea family. Aphids bodies are soft with an oval shape. Reproduction varies but can be both asexual and sexual. Their high reproduction rate is what makes aphids one of the most damaging plant pests in the world. They can live for around 20-40 days. The eggs hatch on a host plant at the beginning of spring through summer and form into larvae. Matured females then reproduce where they there develop wings and transmigrate with the wind. As winter approaches, the females metamorphosis in to males and the reproduction-cycle begins. Incubation of eggs are between 7-8 days. Aphids feed on the sap of plants and they have the ability to spread and carry diseases. Management of aphids can really only be managed by disrupting their life-cycle, with the use of insecticides or the introduction of Coccinellidae. (lady-bugs)

Scirtothrips citri:

The citrus thrip can enter the home through pot plants and can bite humans. The thrip is detrimental to the flowering and reproduction of plants. They cause damage to the flower buds and fruit but sightings of thrips the the main indication of their presence. Thrips are orange-yellow in color and are around half a centimetre. Thrips lay their eggs into the leaves or flowers of plants where their pupae leave visible ringed discoloration. When thrips hatch from their cocoon they feed on the plant, and at this wingless stage they migrate across crops by walking, they then develop through two wingless stages, till their wings develop at maturity. This takes about 20 days for thrips to mature, but their metamorphosis is unique due to a nonfeeding stage called the prepupa before developing into pupae. One of the worst effects of thrips is their ability to carry and transmit plant diseases. Some chemical treatments are necessary in landscape areas where thrip populations can thrive but control of this situation can also be achieved non-chemically if the infestation is spotted early. Although trees can withstand feeding damage, thrips will wait out winter on trees and

it is suggested to treat the tree with garden insect spray with spinosad.

Phyllocnistis citrella:

The citrus leaf miner, the larvae of the moth family, is an insect pest that attacks plants of the citrus family. They are called miners because of the way they tunnel under the surface of leaves to install eggs, leaving silvery trails. Depending on the temperature, eggs hatch in between 2-10 days and the pupae grow from between 2.5mm-4mm and are usually housed within a rolled leaf. This is where the leaf miner causes the most damage before it flies away as a silvery moth.

Control can be achieved through the introduction of spiders, or applying white horticultural oil to suffocate the larvae.

3.

Diseases that effect the mandarin plant can come in the form of fungi and bacteria. These diseases can be spread by growing mandarin plants indoors, wet conditions or the cross contamination of infected plants or barks. Three examples of common susceptible diseases are as follows

Colletotrichum gloeosporioides:

Anthrachnose is a fungal disease that commonly emerges during wet weather throughout spring or prolonged wet weather seasons with warmth in the air, around 20 degrees. Spores called conidia are transferred by wind and rain, where it enters the plants skin and spreads as a mycelium, where they form as black fibrous spots. Anthracnose infection can cause dark staining on fruit, the die back of stalks and the folding of leaves. Control is suggested with the use of a fungicide and monitoring as the spores can spread under the skin of leaves to the stalk.

Thielaviopsis basicola:

Black root rot is a pathogenic fungus that causes cortical cell dysfunction that effects the roots of new plants identified by small black lesions on the root fibres in the first 2-8 weeks of growth and is aggravated by indoor conditions. Black root rot causes the demise of new cells and yellowing of the plant can occur alongside wilting and the browning of fruit, often requiring the removal of the plant. Soil applied fungicides containing benzimidazole and thiophanate-methyl are suited to minimise the risk of plant loss if detected early. Management should consist of monitoring and the sanitisation of planting pots and equipment.

Spiroplasma citri:

This stubborn disease is a bacterium that stunts the growth of plants as-well as producing malformed fruit. Stubborn disease is transmitted by insects in hot or dry atmospheres. Pest management as-well as observation and preventative nursery practices is recommended through monitoring and intervention, plus the sterilisation of equipment.

Citrus Weeds - [201710-CAPCA_ADVISER_NO ADS.pdf](#)

Thistle information - [Canada Thistle Organic Weed Control - Harvest to Table](#)

Purple Haze - [Ipomoea purpurea 'Purple Haze' Morning glory Care Plant Varieties & Pruning Advice \(shootgardening.co.uk\)](#)

Gokshura information - [Gokshura : Benefits, Precautions and Dosage | 1mg](#)

Aphids Characteristics and life-cycle - [Aphids Life Cycle - Gardenerdy](#)

Thrips - [Thrips: Control, Facts, How to Get Rid of Thrips \(orkin.com\)](#)

Citrus Leaf Miner control - [Signs Of Citrus Leaf Miners - Managing Citrella Leaf Miners In The Garden \(gardeningknowhow.com\)](#)

Black Root Rot Management - [Combating Black Root Rot - Greenhouse Product News \(gpnmag.com\)](#)

Stubborn Disease - [Stubborn Disease / Citrus / Agriculture: Pest Management Guidelines / UC Statewide IPM Program \(UC IPM\) \(ucanr.edu\)](#)

Introduction to Nutrient and Water Cycles

Task 1.

Brief explanations of the following terms include:

Photosynthesis – Photosynthesis is the energy powerhouse of all life on earth. It is the process of light from the sun being harvested by chloroplast pigments in plants and organisms into energy. A light into chemical conversion that forms complex sugars and oxygen for molecular growth.

Osmosis – Plant roots use xylem tissue to absorb water from the ground to the leaves and stem through a process known as osmosis.

Chlorophyll – Chlorophyll is the green pigment in plant cells that assist in the absorption of light.

Transpiration – Transpiration is the process of a plant's ability to sweat out excess water.

Respiration – Plant respiration is the conversion of sugars and starches into energy. Aided by oxygen, this chemical conversion takes place in the cell's mitochondria.

Task 2.

Respiration is the food cycle of plants and is integral to its processes and cell growth. Light is needed in duration as well as wavelength for every plant's photosynthetic system.

Transpiration is the vessel process of the water-cycle. Osmosis transfers water from the soil. Temperature can affect the plant's ability to store or retain water.

Respiration ends with carbon-dioxide being released into the air.

Task 3.

Nutrient uptake is a plant's ability to absorb and transfer nutrients from the roots to the leaves by attaching to water molecules throughout the osmosis process. These nutrients are then used for food and energy as well as chemical and cell production. Without nutrient uptake, plants will wilt or become malnourished, and won't pollinate. Growth of the plant can be restricted if nutrient uptake is disturbed by environmental factors such as water, light, temperature and wind. If plants get too hot or too dry or transpire too much, then they can soon become dehydrated, wilt and die. Plant dehydration will inhibit nutrient and water uptake, but this can be avoided with more care and understanding around a plant's environmental needs and requirements to flourish.

Task 4.

Plant processes listed below are essential to plant growth and regeneration because,

Photosynthesis – Plants gain energy from light which is obtained through the process of photosynthesis. Photons are converted to complex sugars which encourage energy and cell growth.

Movement and Transpiration – Movement and transpiration of water nourishes the plant and allows the transference of nutrients. Osmosis, movement and transpiration are the water-cycle of the plant life.

Respiration – As a result of photosynthesis carbon-dioxide is released into the air. This oxygen transfer is part of the plants respiration process and nutritional profile.

Nutrient Uptake – Nutrient uptake is a plants ability to absorb nutrients from its environment. Plant root fibres absorb nutrients from the soil and transfer this to the stem and leaves.

Water Uptake – Water uptake is essential to the hydration and transference of nutrients of the plant. Water is absorbed from the atmosphere and the soil.

Task 5.

Water

The natural movement of earths water from the mantle to the upper atmosphere is called the water-cycle. This encompasses all water through it's transmittable forms and it's mollecueal use by plant life is its ability to transport nutrients and re-hydrate the plant. Rain from the atmosphere enters soil, which it is then absorbed by the roots of plants, then to the stem and leaves. Water is later sweated by perspiration, entering the surrounding atmosphere and therefore re-joining the water-cycle.

Nitrogen

Known as a biogeochemical process, nitrogen enters soil from the atmosphere and there, is converted into many forms, from ammonia to nitrates, where it is used by plants or released back into the atmosphere. Nitrogen is required for cells and is a major compoment of chlorophyll, the green pigment in plants.

Calcium

Calcium is stored in geological compositis and is leached into our soils by erosion, wind and the decompisition of dissolved or solid organic material. Calcium ions are transferable, as chemical or mineral elements and are essential for our soils and plant roots. Calcium is constantly being recycled back into our soils by percipitation, decompisition, leaching and nutrient uptake.

Magnesium

Magnesium enters the atmosphere through salt deposits, the weathering of rocks leaching and erosion. Magnesium travels through the atmosphere and settles in soil where it is absorbed by the nutrient uptake of plants where it is essential for the photosynthesis process and cell reproduction.

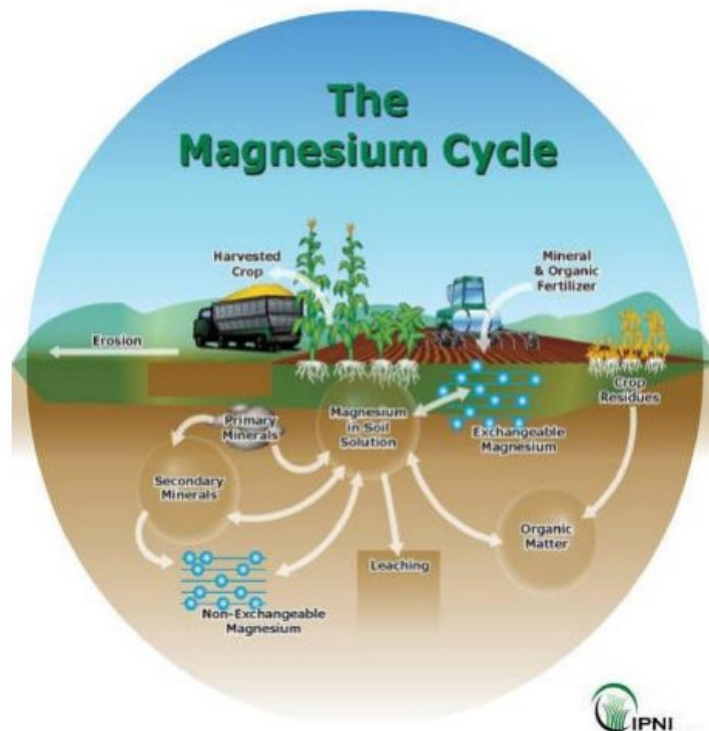


Figure 5. The Magnesium Cycle, (Kaiser & Rosen, 2016)

Introduction to Outdoor Vegetables

The Crop:

My Amazing Daughter Kindred LOVES Capsicum so

Capsicum – *Capsicum Annuum*.



Southern Paprika Limited is a new Zealand company whom since 1988 have been commercially and successfully growing quality capsicums in New Zealand's largest single site glass house, just an hour's drive north of Auckland. Housed in this complex on average is 1 million capsicum plants, of which, each produce around 40 capsicums a season.

Capsicums have a significant market globally, as well as a whole bunch of nutritional benefits. Capsicums are 94% water and are tropical plants that germinate best in warm moist soil a quarter inch from the surface. Spring is the best time to germinate your seeds as capsicums grow in New Zealand generally around August to November and they require a lot of sunlight and typically take 60-90 days to mature. The life cycle of annual capsicum depends on pollination for fruit to develop. Self pollination and cross pollination occur in capsicums and as the plant matures, the chlorophyll breaks down and the green capsicums turn to a shade of colour. Capsicums grow dense foliage and about a meter high.

Species and Propagation:

Of the 20-27 species of capsicum available, it's generally accepted that only 5 are domesticated. These are *capsicum annuum*, *c. baccatum*, *c. chinense*, *c. frutescens*, & *c. pubescens*.

In 1984 New Zealand Company Alexander Cropping LTD grew Field Capsicum outdoors for the domestic market, but after 5 years, they decided to take the production indoors, as

well as achieving 12 day germination for reasons of quality and increased production. The capsicums are propagated from the seeds of a healthy harvest.

Environmental Requirements:

For the best production of quality capsicum, the environmental requirements of the plant are that it is grown under cover, reducing the impact of wind and torrential rain. Covered crops allow full control over the water and nutrients provided, and New Zealand naturally provides enough sunlight, but still, the green house is often heated, at around 17-20 degrees and situated in aspect to orientation and direct sunlight. Capsicums are light sensitive and require about 6 hours of sunlight and shade a day. Capsicums are grown in hefty soil and fertilized with compost and nutrients such as calcium and magnesium.

Production Planning:

When growing capsicum, care should be taken in where to plant. Capsicums require warm temperatures with no frost or high wind velocity in well drained, loose soil. The germination process is slow, taking up to 10-12 days and from there, take around 60-90 days to maturity. From 15-20 days after transplant, pruning your capsicum plant is suggested as well as drip line watering. Too much nitrogen in the soil will increase foliage growth and seaweed or compost is a nutritional fertilizer. Shaking the plant at bloom will also help pollination.

The Crop:

Silverbeet – *Beta Vulgaris*.



Woodhaven Gardens is New Zealand's largest commercial growing operation on the fertile soils of the Horowhenua region. For over 30 years, Woodhaven have grown silverbeet with intent to minimise and mitigate the quality of the soil resource for future generations as they can produce silverbeet all year round. The seed savers organisation lists about 12 different varieties of silverbeet, which is of the beet family, in 5 different colours. Attributes of the plant go to its dense nutritional and health benefits as well as its annual ability to grow all year round, propagated by seed. Harvesting of silverbeet is taken at ones, as the leaves mature, because the silverbeet plant has the ability to store plenty of carbohydrates needed for additional leaf growth, so will continue to grow as you harvest when needed.

Species and Propagation:

There are 12 different varieties of silverbeet and the greeny, traditional 'fordhook giant' is a popular garden choice for its quality and sturdiness as well as its high yield. As silverbeet should be planted directly where it will grow and silverbeet requires slightly alkaline soil with a P.H. of 6 or above. This can be achieved by being well composted with animal manures and be provided plenty of drainage.

The germination period of silverbeet can be assisted by soaking the seeds for a few hours, before planting.

Environmental Requirements:

As silverbeet is a plant that will grow all year round, it is best to plant silverbeet in garden beds, in full position of the sun, where they gain around 6-8 hours of light. Silverbeets soil tolerance can be assisted with fertile, well worked soil, loose and retains moisture. When it is winter, you can protect your silverbeet from the frost by pushing up a mound of dirt at the base of the plant and covering the area with dead leaves.

Production Planning:

First, choosing a secure garden bed in full sun is smart as it is best to sow seeds where the plant will grow. Soil, combined with compost and manure will provide the nitrogen and magnesium. Watering your soil before and after planting, then feed regularly to promote growth. When the silverbeet has grown, which is 8-10 weeks from sprout, regularly pick your silverbeet to encourage more growth.

References used:

Southern Paprika LTD: [Southern Paprika - Growing since 1988](#)

Capsicum Production: [Greenhouse Capsicum Cultivation Project Report | Agri Farming](#)

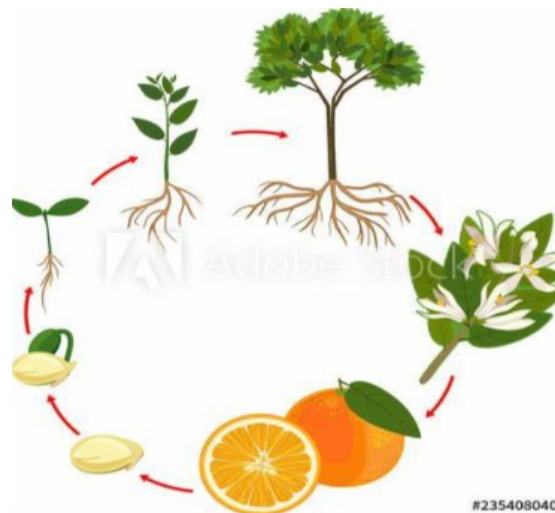
Woodhaven Gardens: [Silverbeet | Woodhaven Gardens](#)

Silverbeet Growth Fact Sheet: [Grow Silverbeet, Swiss Chard | Sustainable Gardening Australia \(sgaonline.org.au\)](#)

Introduction to Nursery Production

The Crop:

Mandarin Plant – *Citrus. reticulata*



T&G Global is New Zealand's largest citrus fruit grower that specialises in mandarin and fruit production. Situated in Keri Keri and Gisborne T&G Global provides 60% of our mandarin consumption in New Zealand. Genetic analysis of *C. reticulata* suggests that mandarin is of a single species, and any varieties are due to hybridization.

Mandarins enjoy full sun and can be potted with good drainage. They can grow between 10-25ft tall and wide but they often don't produce fruit until their 3rd year or biennial, of which, within this period, pruning is encouraged. A free from frost preparation as well as a pesticide and fungicide for root rot will be all the help this somewhat resilient plant will need.

Species and Propagation:

From its core ancestor, the mandarin plant has been hybridized (through grafting) to form a large number of species varieties (*wikipedia*) from which several are most common such as:

- **Emperor** – Pale orange skin, great flavour, easy to peel.
- **Imperial** – Early season, easy to peel.
- **Satsuma Miho** – Extra early yield, very sweet, smallish tree (can be planted in pots)
- **Mandarin Murcott** – Late in season, very good taste, few pips though not as easy to peel than others.
- **Mandarin Encore** – Great flavour, easy to peel.

Mandarins are propagated from either cutting or seed. Seed propagation consists of soaking

the seed (scarification) for 12-24 hours before planting, in an indoor temperate climate until a strong root system is formed and the mandarin tree can be re-potted. A stake is suggested, to support the branches, and the tree prefers to be deeply watered twice a week. Pruning regularly will provide a sturdy trunk and that great umbrella look from afar, as well as more fruit. Pruning in summer will ensure a large yield in time for winter.

Environmental Requirements:

Choosing a sunny spot is important when planting a mandarin tree as they prefer 8-12 hours of sunlight per day. Loose nutritious soil that is water retentive will provide a nourished tree. Mandarin trees require a climate of around 20 degrees average and they have a medium growth speed.

Market nutrients such as magnesium and plant food will assist with growth and covering the base of the tree with pea straw will protect the base from frost.

Production Planning:

It's best to plant your mandarin tree in spring, blossoms appear in March and April and fruit is ready in autumn. With a sunny place that is out of wind gusts, staked and housed within fertile loose soil with well drainage, the roots will adapt and from there can be watered twice weekly. So mandarin production takes around 10 months. Pruning and thinning is encouraged to promote fruit production.

Pests and diseases could include aphids, root rot, citrus leaf miner and citrus gummosis. It is recommended to control this threat and a healthy plant can be obtained through fertilization with minerals such as copper and zinc (from plant food) and watered now and again with Epsom salts to increase magnesium and iodine content.

The Crop:

Tobacco Plant – *Nicotiana. tabacum*



Tobacco seeds as well as the smoking habit were brought to our shores by whalers in the early 1800s. Maori adopted the practice, first growing tobacco around the Rotorua region in 1839. (theprow) But, with this particular plant, in 1935 the Tobacco Industries Act was

formed by the New Zealand Government to regulate the industry and minimise over-production, through the creation of a growers registry obligation.

In September of 1999 London based company Rothmans of Pall Mall (NZ) LTD merged with W.D & H.O Wills (NZ) LTD to form British American Tobacco (NZ) LTD where tobacco today is grown outdoors near Motueka in the Tasman District and processed at a factory near Wellington.

Tobacco is in the genus of *herb* and is of the nightshade family. Nicotine is a powerful neuro-toxin to insects and nicotine contents vary across the vast specie. Grown indoors, plants are often transferred to the field at around 20cm tall. A mature plant can grow upto 5ft

Tobacco seeds are tiny and they require warm temperature and light to germinate. They appreciate full sun and fertilized soil. In New Zealand, tobacco grows best through spring to autumn. At maturity, they produce small, pretty pink flowers.

Seeds and Propagation:

Of the 70 species of *Nicotiana* the chief commercial crops are *N. tabacum* and *N. rustica*. *N. tabacum* is resilient in it's growth around the Tasman District as well as it's consumer popularity. Seeds are germinated and sprout indoors under warm conditions or in hotbeds and are then transferred to the field after around 8 weeks. From here they grow in full sun to produce burly leaves. Seasonal factors that dictate timing are the natural climate of spring through to autumn, and a combination of natural/controlled irrigation to ensure the plants have a steady growth cycle.

Environmental Requirements:

Tobacco seeds require warmth around 20-25 degrees and light, to germinate. From there they enjoy around 6-8 hours of sunlight per day and protection from the wind. Fertile loose soil with good drainage and nutrient dense plant food will encourage leaf growth. If you over water the plant the leaves get weak and thin.

Production Planning:

Germinating and growing the seedlings indoors is a great start and then the tobacco plant can be further kept indoors, or transplanted to the field or pots outdoors. From maturity, the plant is self fertile and the consumable product is the leaf. The art of tobacco production & planning is in it's drying and curing.

Harvesting consists of picking the *volado* leaves near the ground, the *seco* leaves in the middle and the potent *ligero* leaves at the top when they become yellow. Curing consists of drying the tobacco leaf in a controlled environment. You can dry the plant in a bunch, or it is suggested to slice the stem of the leaf with a razor blade and hang to dry. You can spray the drying leaf with alcohol or essential oils to flavour or promote drying and burning. Care should be taken to ensure that the leaf does not become brittle, or too moist as this could encourage mould growth. Timing is of the essence here as drying can take around a year. Drying, using varing methods, can take between 3 months - 2 years. Cutting the tobacco leaf includes cutting into thin strips, either using a pasta grinder, or rolling the leaf and chopping thin strips using a knife and a chopping board.

T&G Global: [Citrus | T&G Global \(tandg.global\)](#)

Growing Mandarins: [How to grow Mandarins \(yates.com.au\)](#)

Mandarin Fact Sheet: [Mandarin tree - How to grow & care \(growplants.org\)](#)

British American Tobacco NZ LTD: [British American Tobacco New Zealand - About us \(batnz.com\)](#)

Tobacco Arrival: [Motueka Growth Rooted in Tobacco \(theprow.org.nz\)](#)

Tobacco Plant: [Tobacco - Wikipedia](#)

Tobacco Curing: [How to Grow and Cure Tobacco at Home - Dengarden](#)